Space Weather Forecast

Issued on Thursday, 04 November 2021 at 00:27 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Slight chance of further M-class flares. G1/Minor or G2/Moderate geomagnetic storms expected on day 1 and 2 (4th and 5th), and slight chance of further G3/Strong geomagnetic storms early day 1.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: There are two sunspot regions on the visible disc with observed solar activity returning to Low over the past 24 hours. The peak flare was a long duration Common class flare at 03/2117 UTC from the sunspot region transiting the northwest quadrant (which gave the Moderate flare and Earth directed CME early on 2nd). This region has reduced slightly in overall size, and decay in its lead/trailer spots. The other sunspot region in the northeast quadrant appears stable with very little recent activity. A CME appears to have left the Sun associated with the common class flare, this will be analysed once imagery becomes available.

The CME from the early hours of the 2nd November arrived at Earth around 03/2000 UTC. A further CME was observed directed towards the southwest launched from near the southwest sunspot region after midday UTC on 2nd. This was modelled and misses Earth. Two further CMEs were observed, one late on 2nd from beyond the west limb, and another during early hours UTC of 3rd from beyond the east limb. Neither of these CMEs is expected to be Earth directed.

Solar Wind / Geomagnetic Activity: Solar wind parameters increased following the CME arrival to around 750 km/s. Total interplanetary magnetic field was at weak levels before becoming strong post CME, with the important north-south component fluctuating from negative to positive. No extended periods of negative values were observed. Geomagnetic activity was Quiet to Unsettled becoming Active with a G3 Strong geomagnetic storm observed between 03/2100-2359 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained slightly elevated only very briefly exceeding minor storm levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is forecast to remain mainly low through the next four days, but with a continuing slight chance of Moderate class flares from the spot currently transiting to the northwest quadrant.

Solar Wind / Geomagnetic Activity: The strong solar wind speeds following the arrival of the CME are likely to continue through day 1 (4th) and into day 2 (5th), easing back thereafter though confidence is low due to uncertainties regarding the duration of likely CME influences. Minor or Moderate geomagnetic storms are expected on days 1 and 2 with a slight chance of a G3 Strong storm early on day 1. Thereafter a likely return to Quiet to Unsettled conditions with a Slight Chance of Active intervals.

During the early hours of day 1 aurora is likely to be visible under any clear skies as far south as the Midlands. Overnight into day 2 Scotland and North Ireland may be able to view it.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is expected to be below storm level with a slight chance of exceedance on days 1 and 2 (4th and 5th).

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	90	70	20	10
Strong	G3	Yes	20	10	1	1
Severe	G4	No	5	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	20	20	20	20
Very Active	R3 to R5 X	No	2	2	2	2

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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